Office of Earth Science Enterprise (Code Y)
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The total Fiscal Year 2001 budget request for NASA's Earth Science Enterprise is $1.406 Billion.

FY 2001 Budget Restructure

NASA has restructured the Earth Science Budget in FY 2001 to display the resources being allocated to Research and Technology requirements in a way that can be more readily understood by NASA's customers. As a result, the Research and Technology requirements have been allocated into three categories: Earth Science Program Science, Applications Commercialization and Education (ACE) and Technology Infusion. This restructured format aligns the Research and Technology requirements with the way that they are managed within the Agency. A crosswalk from the Old Structure to the New Structure by Fiscal Year is provided in the Special Issues Section.

The goal of NASA's Earth Science Enterprise (ESE) is to understand the Earth system and the effects of natural and human-induced changes on the global environment. NASA is pioneering the emerging interdisciplinary field of research called Earth System Science, borne of the recognition that Earth's land surface, oceans, atmosphere, ice sheets, and biota are both dynamic and highly interactive. Earth System Science can produce immense benefits to the nation, yielding new knowledge and tools for improved weather forecasting, agriculture, urban and land-use planning, and many other related areas of both economic and environmental importance. In concert with other agencies, countries, the global research community, and commercial partners the ESE is providing the scientific foundation needed for complex policy choices that lie ahead.

To that end, NASA is developing a series of spacecraft, airborne instruments and ground-based field experiments to study our planet, a vast database management system to catalog the subsequent findings, and an active research program to utilize these tools. In 1999 the EOS era of NASA's ESE began with the launch of the Landsat 7, QuikScat, Terra, and ACRIMSAT missions. Other currently operating spacecraft include the Tropical Rainfall Measuring Mission (TRMM), the Total Ozone Mapping Spectrometer Earth Probe, the TOPEX/Poseidonocean studies mission, and the Upper Atmosphere Research Satellite.

Ongoing data from the Sea-viewing Wide Field-of-View Sensor (SeaWiFS), which measures ocean productivity and provides land use data via a data purchase agreement, is showing exciting new findings about the behavior and life within our oceans. Scientific results from TRMM continue to exceed all expectations. Additionally, instruments aboard aircraft are measuring atmospheric chemistry, biomass burning and land surface changes ranging from Greenland to the storm-ravaged beaches of the U.S. East Coast and the effects of El Niño on the nation as a whole.

Highlights of the Fiscal Year 2001 Budget include:

Research and Technology -- $353 million

The goal of the Research and Technology Program within the ESE is to advance our understanding of the global climate environment, the vulnerability of the environment to human and natural forces of change, and the provision of numerical models and other tools necessary for understanding global climate change. Major emphasis has been placed on near-term results and providing early warning and fast response to global environmental issues that could pose risks to society, such as climate change, atmospheric ozone, and natural hazards.

An important related priority is accurate assessment of the extent and health of the U.S. and the world's forests, grasslands, and agricultural resources. Observations from space are the only source of objective information on the impacts of climate variations and human use of land in an era of rapid land use development.

The major activities supported by this funding include Research and Analysis, Earth Observing System Science, Airborne Science and Applications, and Commercial Remote Sensing cooperation with industry. There are currently more than 1,700 Earth Science-related scientific activities being funded under the research and analysis program. Approximately 900 are carried out by universities, 100 by national research laboratories and 700 by federal agencies, in a total of 45 of the 50 U.S. states.

Mission Implementation & Operations -- $862 million

This portion of the Enterprise comprises satellite missions, information systems, and operations. EOS, the largest element of NASA's ESE ($447 Million), is a program of multiple spacecraft designed to provide measurements of the key, multi-disciplinary parameters needed to understand global climate change. The first EOS spacecraft, Terra and Landsat-7, were launched in 1999. The instruments aboard Terra will enable scientific studies of the physical and radiative properties of clouds; air-land and air-sea exchanges of energy, carbon and water; measurements of trace atmospheric gases; and volcanology. Landsat-7 is making important land-use and land processes measurements, complementing and improving upon those made by previous Landsat spacecraft in building the largest database of medium resolution land surface images of Earth's continents. These missions, plus the EOS Aqua (formerly PM-1) and Chemistry-1 missions, will help achieve the fundamental EOS measurements, which will begin our understanding of the Earth system. Aqua and Chemistry-1 remain on track for launch in 2000 and 2002, respectively. The EOS program also includes several small spacecraft such as the U.S.-French TOPEX/Poseidon follow-on mission known as Jason-1, QuikScat, ICESat, SORCE, and ACRIMSAT.

The Earth Probes program ($120 Million) addresses specific, highly focused Earth science questions that are new or complementary with other parts of NASA's ESE. It also has the flexibility to take advantage of new opportunities in international cooperation, small satellites, and technical innovation. Currently approved Earth Probes include the Total

Ozone Mapping Spectrometer-EP, Triana, and the Earth System Science Pathfinder missions (the Vegetation Canopy Lidar and the Gravity Recovery and Climate Experiment, Cloudsat, and Picasso-CENA).

PICASSO-CENA, the third Earth System Science Pathfinder mission, was selected in December 1998. Together with the EOS Aqua mission, PICASSO-CENA will allow Earth scientists to study the three dimensional structure of the atmosphere and its role in the Earth's weather and climate. It will be launched together with Cloudsat, which will measure the vertical structure of tropical cloud systems.

NASA and the NOAA/DoD converged weather satellite program are teaming up to design a new mission to simultaneously gather research data for NASA on atmospheric physics, land cover, and demonstrate instruments for the Nation's operational weather system.

The EOS Data Information System (EOSDIS) ($252 Million) has been serving thousands of users by providing available data and information from NASA-sponsored programs since September 1995. EOSDIS will operate the EOS spacecraft, and acquire and distribute the basic data gathered by them. This will lay the groundwork for both the government and its commercial and academic partners to generate the higher-level data products that will make the measurements more easily understandable and usable by researchers, educators, policy makers, and the public. Eight Distributed Active Archive Centers provided 1.2 million users with nearly 6 million data products in 1999. In addition, 19 public/private partnerships are generating data products for applications beyond science, including agriculture, urban and regional planning, and disaster management.

Data interactivity relationships with other nations, including Canada, Japan, Russia, Israel, Australia, and several European nations continue to be explored. In the past three years over 60 international agreements between the Enterprise and foreign governments have been signed, with Earth Science programs cooperating in some capacity with more than 35 nations around the globe.

The Mission Operations Program ($43 Million) acquires, processes, and archives long-term data sets and validated data products. These data sets support global climate change research in atmospheric ozone and trace chemical species, the Earth's radiation budget, aerosols, sea ice, land surface properties, and ocean circulation and biology. Funding provides for operating spacecraft such as UARS, TOPEX, ERBS, TOMS, TRMM, and processing of acquired data.

Technology Infusion -- $111 million

The ESE is investing in science instrument technologies to dramatically reduce the cost of future missions (post-2002). An integrated technology program is paving the way to a "better, faster, cheaper" mission set.

The New Millennium Program focuses on identifying and demonstrating advanced technologies that reduce cost or improve performance of spacecraft, instruments, and operations. The program emphasizes partnering with industry, academia and other Government agencies, and is committed to the development of cutting edge technologies,

techniques and engineering capabilities that will reduce development, and mission operations costs. The ESE will continue to develop advanced end-to-end mission information system technology for collecting and disseminating information about Earth system science and technology to the public and private sectors. New Millennium missions include the Earth Observing mission (EO-1), which will carry an Advanced Land Imager and a newly selected EO-3 mission to demonstrate advanced technologies for Earth observation from geo-stationary orbit.

In addition, the Instrument Incubator Program supports the development of new instruments and measurement techniques from concept to laboratory development and ground or air validation, offering opportunities for timely development of new technologies and their infusion into NASA missions. Development of advanced information system technology will continue to play a key role in the Earth science missions as we move into the next century.

Applications, Commercialization, & Education -- $69 million

Along with basic Earth science research, ESE also conducts Applications Research to help universities and State & local governments apply remote sensing data and science to practical problems. ESE has established seven Regional Earth Science Applications Centers (RESACs) to target efforts on specific regional issues.

The Commercial Remote Sensing Program (CRSP) at the Stennis Space Center works with industry to extend the utility of ESE's science data within the broader U.S. economy. Through partnerships with CRSP, companies gain assistance in product development and in validation of new remote sensing instruments, or can serve as providers of data and information to NASA and other customers.

ESE is also working to train the next generation of Earth scientists and to enable K-12 teachers to incorporate remote sensing information into their science curricula. One such means is through the Global Learning and Observations to Benefit the Environment (GLOBE) program, which connects scientific discovery with the education process by linking K-12 school children, teachers, and scientists from around the world together to make Earth-related measurements and share the resulting data. This interagency research and education program is producing a better understanding of global environmental change while helping all students reach higher levels of achievement in science and mathematics.

Investments -- $10 million

The Earth Science Strategic Enterprise investments in higher education institutions include Federally mandated outreach to the Nation's Historically Black Colleges and Universities (HBCUs) and Other Minority Universities (OMUs), including Hispanic-Serving Institution and Tribal Colleges and Universities. This outreach is achieved through a comprehensive and complementary array of strategies developed in collaboration with the Office of Equal Opportunity Programs. These strategies are designed to create a broad-based, competitive aerospace research capability within Minority Institutions (MI's). This capability fosters new aerospace science and technology concepts by integrating Earth

Science Enterprise-related cutting-edge science and technology concepts, practices, and teaching strategies into MI's academic, scientific and technology infrastructure.

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